Local Population Projection Tool

Our Progress Since the 2015 Esri UC

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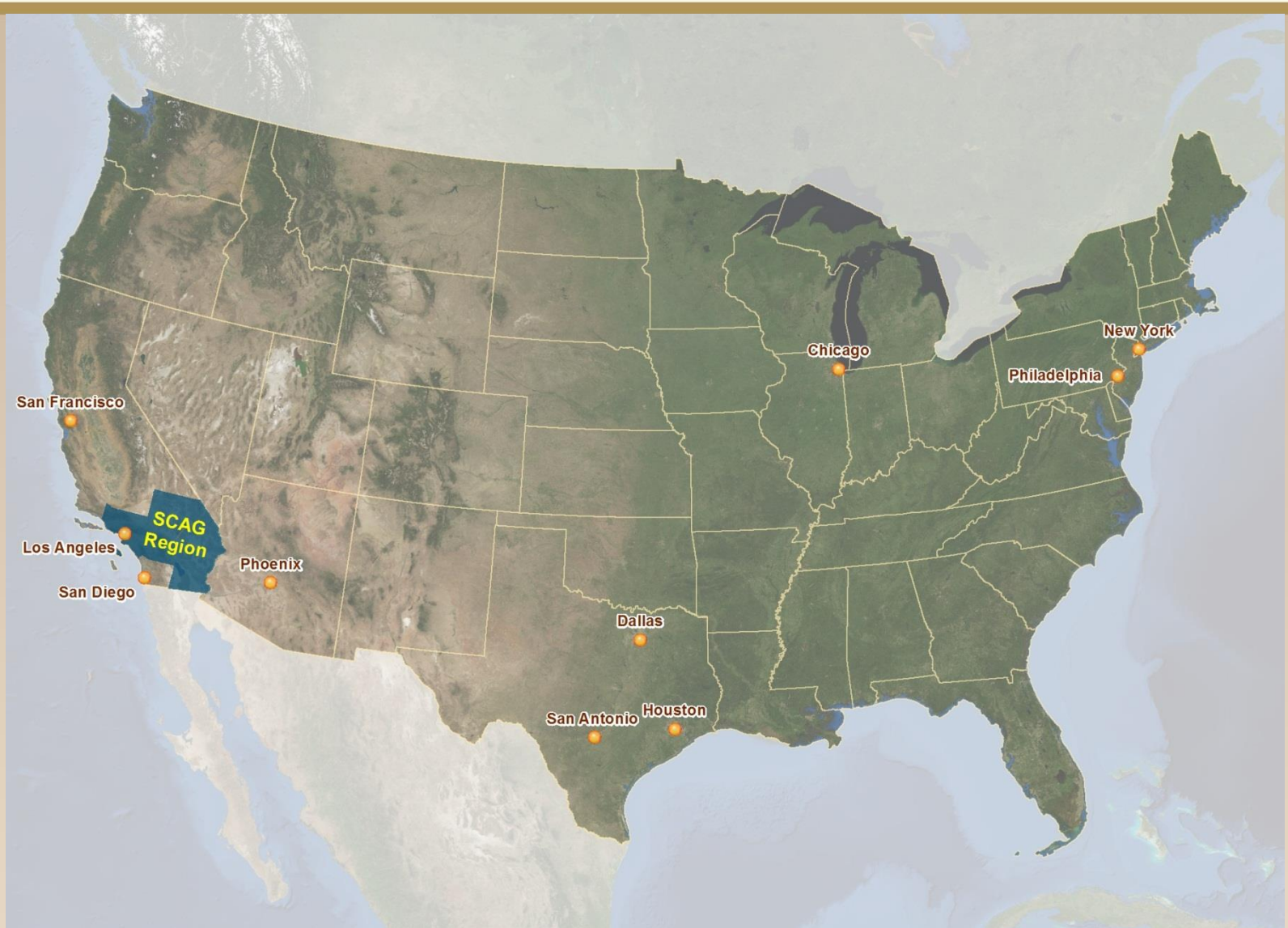
Agenda

- SCAG Introduction
- Research Background
- Recap of Last Year's Presentation
- Progress Made
- Issues Encountered
- Future Developments

SCAG Overview



SCAG Quick Facts

- Nation's largest Metropolitan Planning Organization (MPO)
- 6 counties and 191 cities
- 15 sub-regions
- 19 million people (2015)
- 38,000 square miles
- 16th-largest regional economy in the world
  - 2015 GRP: $1,053 Billion

Research Background

- SCAG develops the long-term population and household growth forecast for the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) at different levels of geography.
- Local jurisdictions in the SCAG region provide SCAG with the city-level population and household growth forecast allocated at the Transportation Analysis Zone (TAZ) level.
- Traditional approach focuses on total population size and household numbers for local jurisdictions. The Local Population Projection Tool has the power to be more specific.

Research Goals

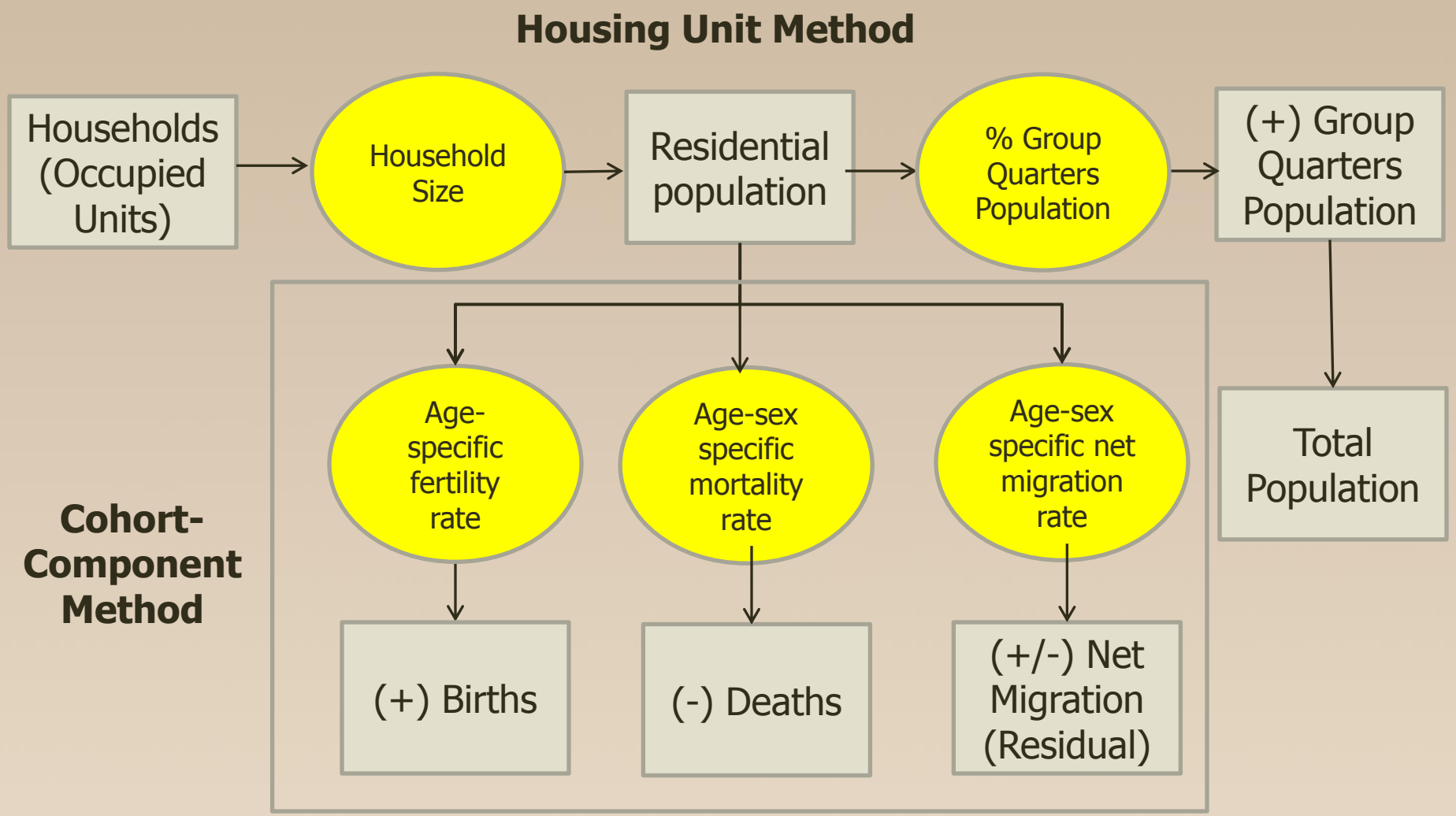
- To develop a useful GIS-based tool for local planners who work on local population and household projections
- To generate different population growth paths containing demographic characteristics (i.e. age and gender) and components of growth based on housing growth scenarios
- To help local jurisdictions to better prepare for diverse community service needs (e.g. school, housing, energy use, hospital, police, transportation)

Modeling Framework

- Methods used
  - Housing unit method
  - Cohort-component method
  - Local household forecasts

(*Choi, Projecting Small Area Population Size and Components, Presented for Western Regional Science Association (WRSA) Annual Meeting, 2013*)

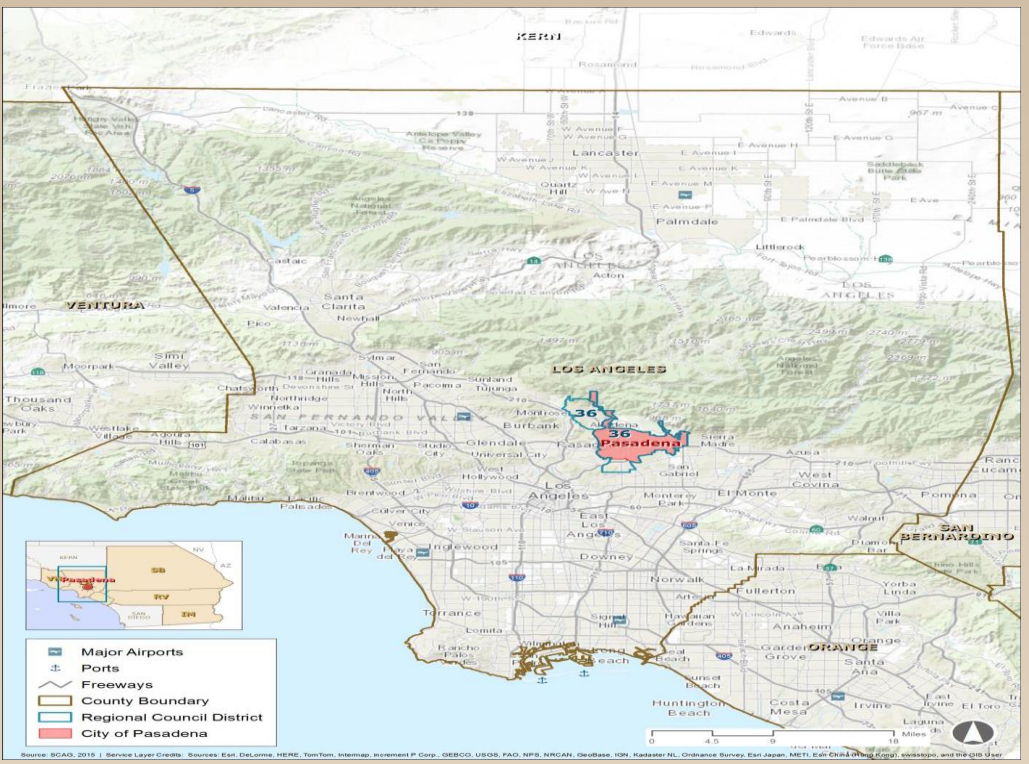
Modeling Framework



Research Outcome: Local Population Projection Tool

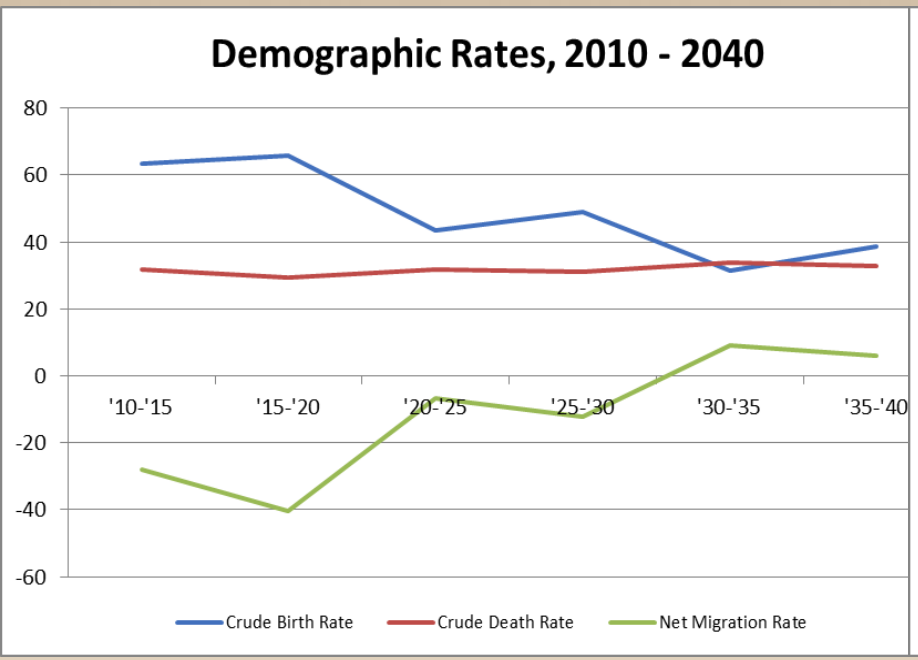
- GIS tool that allows local planners to:
  - Develop their own housing growth scenario
  - Produce the population projections with key demographic characteristics
    - e.g. components of population growth
    - e.g. share of the county growth
    - e.g. demographic rates
    - e.g. age and sex breakdown
- Can be linked to other expansion modules to observe the relationships between demographics and transportation

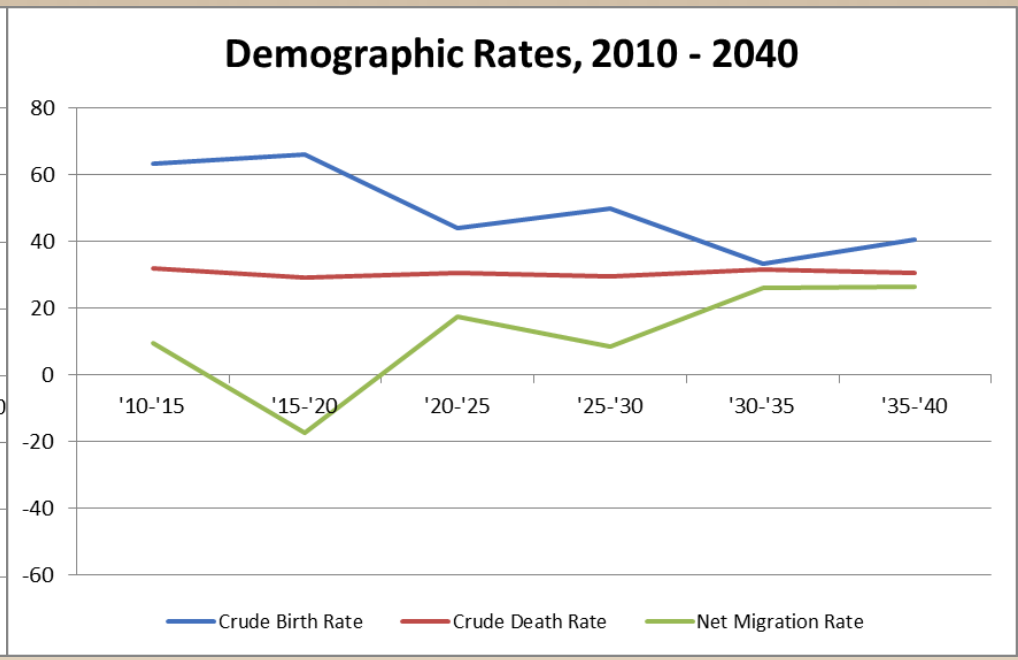
City Projections Demonstration: City of Pasadena



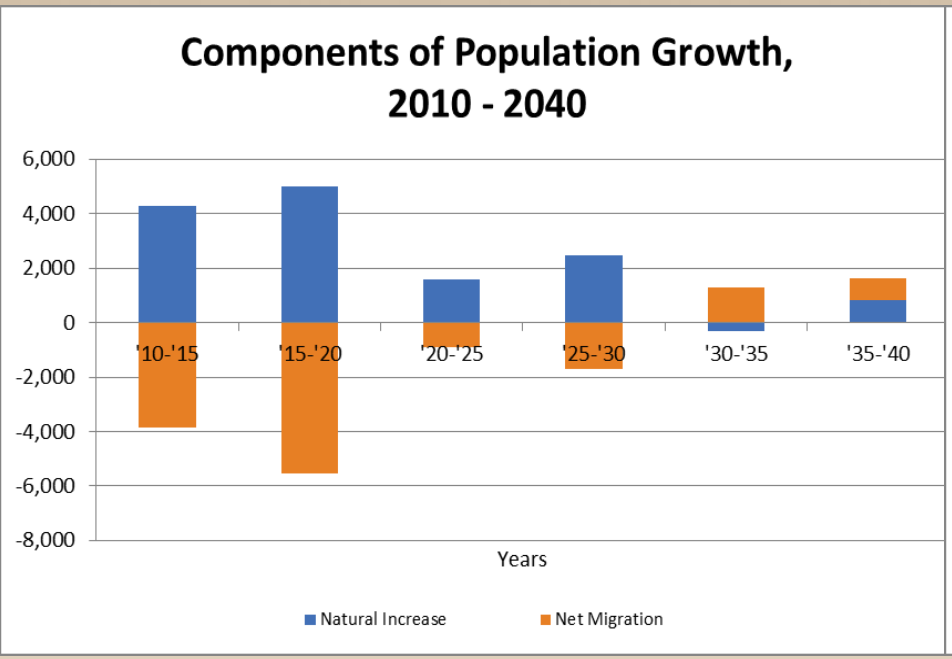
- 137,122 population and 55,270 households in 2010 (U.S. Census) and 111,000 jobs in 2012 (SCAG).
- 23.1 square miles of land area
- 5,936 people per square mile, 2.5 times more than LA county (2,420)
- The median age is 35.7, higher than LA county (34.8)
- Average household size of 2.5 people, lower than LA county (3.0)
- Household growth scenario (2010-2040): (1) low - 150% of 2000-2010 growth (2) high – 450% of 2000-2010 growth

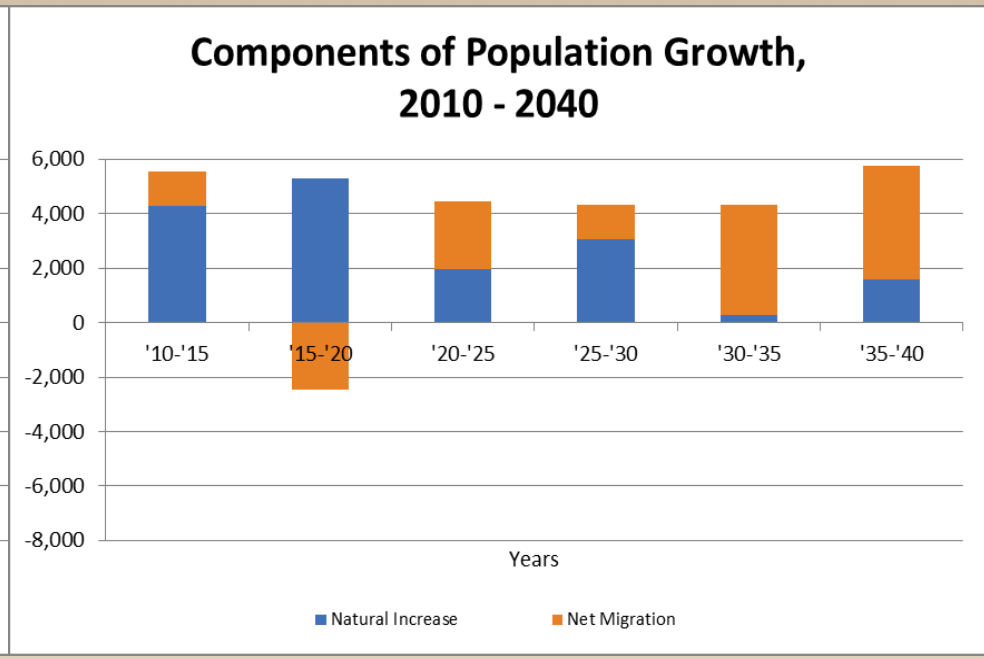
Pasadena Demographic Rates, 2010-2040: Low Scenario vs. High Scenario



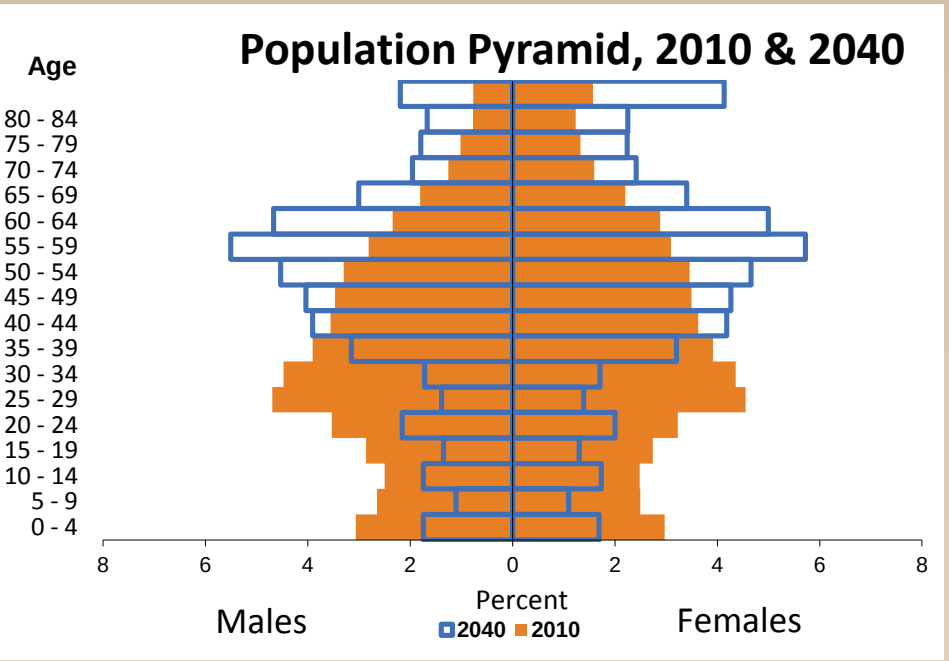


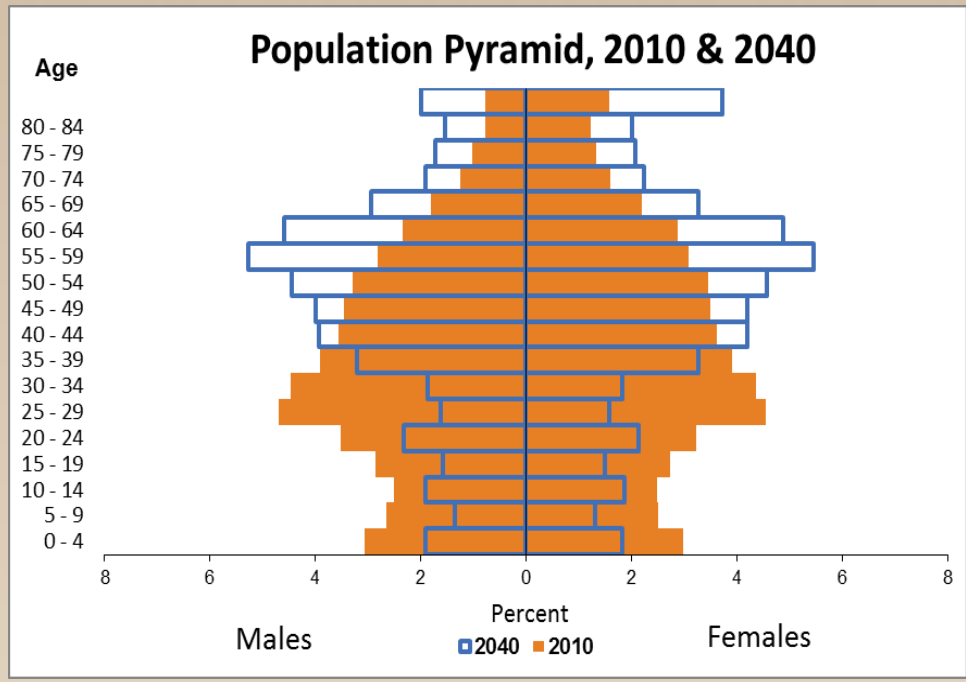
Pasadena Components of Population Growth, 2010-2040: Low Scenario vs. High Scenario



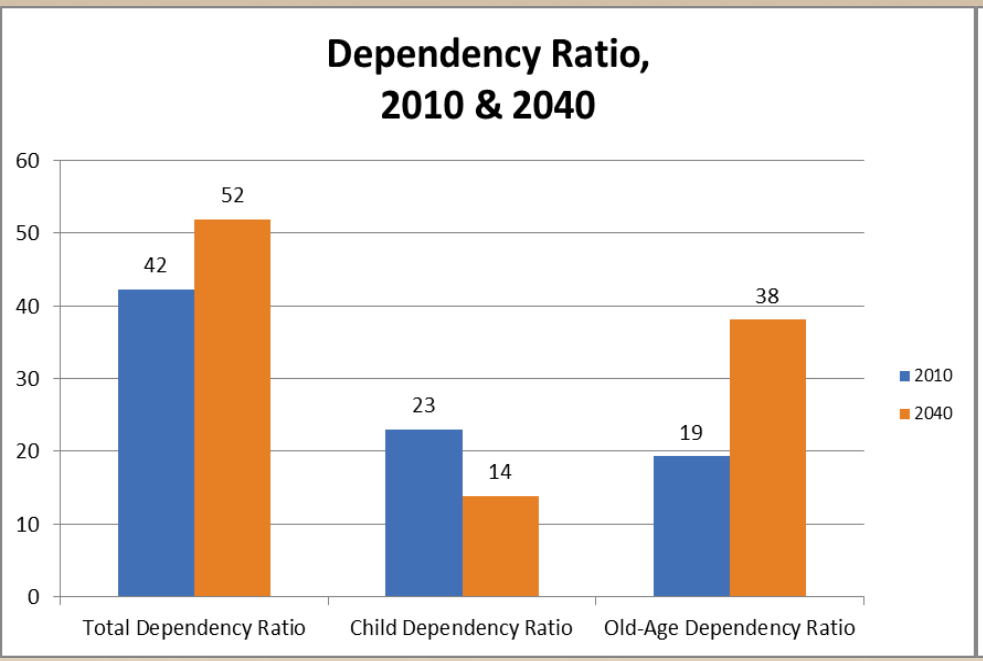


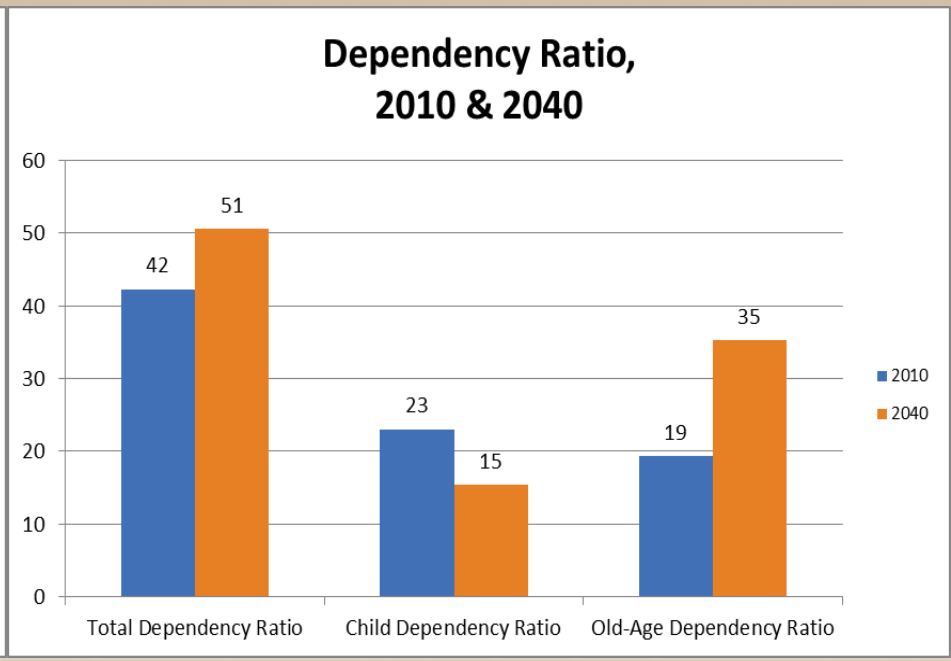
Pasadena Population Age Pyramid, 2010 & 2040: Low Scenario vs. High Scenario





Pasadena Population Dependency Ratio, 2010 & 2040: Low Scenario vs. High Scenario

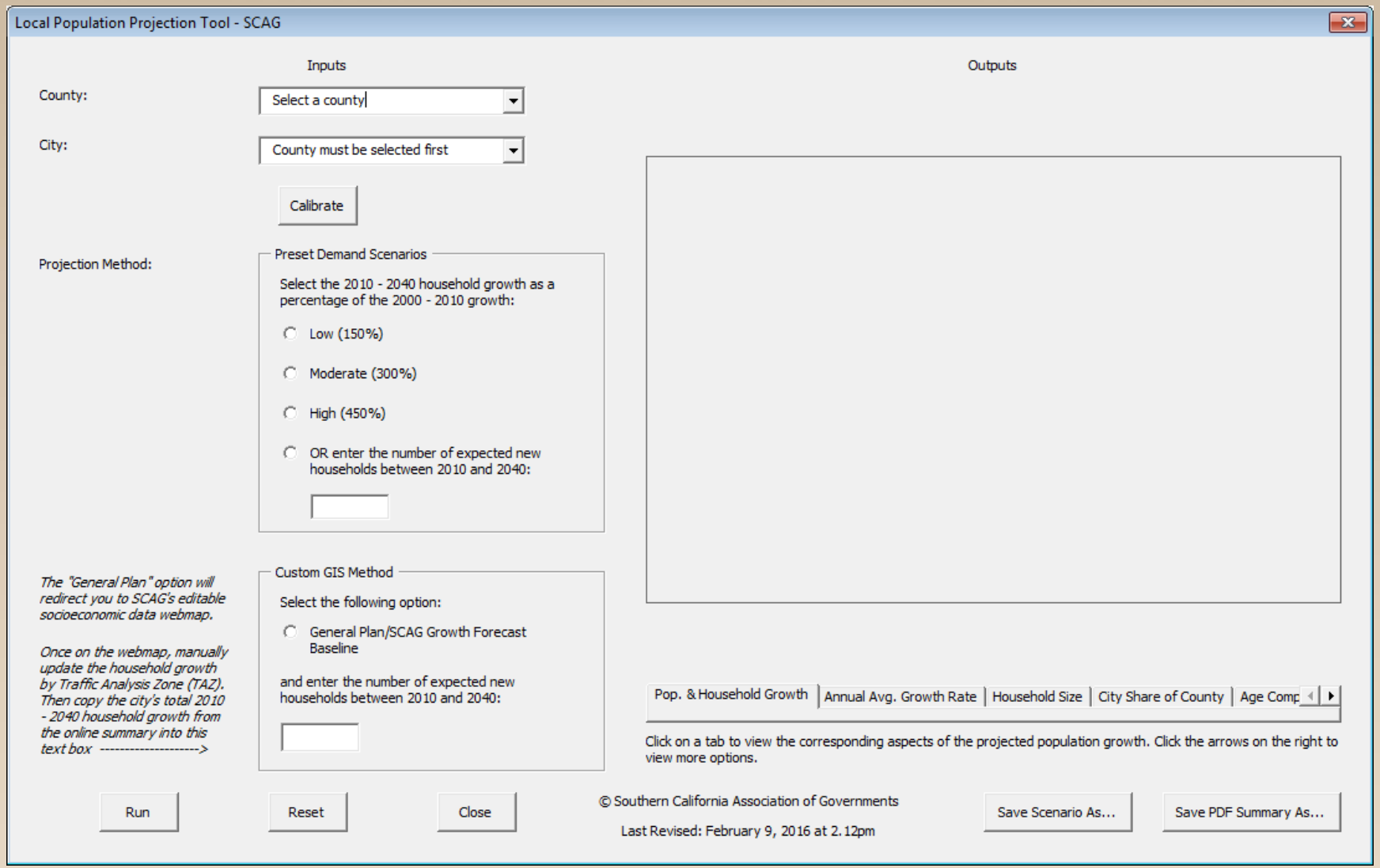




Recap of Last UC & Progress

- **Last year:** Local Population Projection Tool prototype presented at the Esri UC
  - One city only (Oxnard)
  - User updates were not aggregated to city level (i.e. TAZ only)
  - No city-level data summaries
  - No field aliases
  - Values could not be reset to match SCAG forecasts
  - Standard Esri appearance
- **Now:** Complete Version 1.0 ready for testing

2015 Prototype



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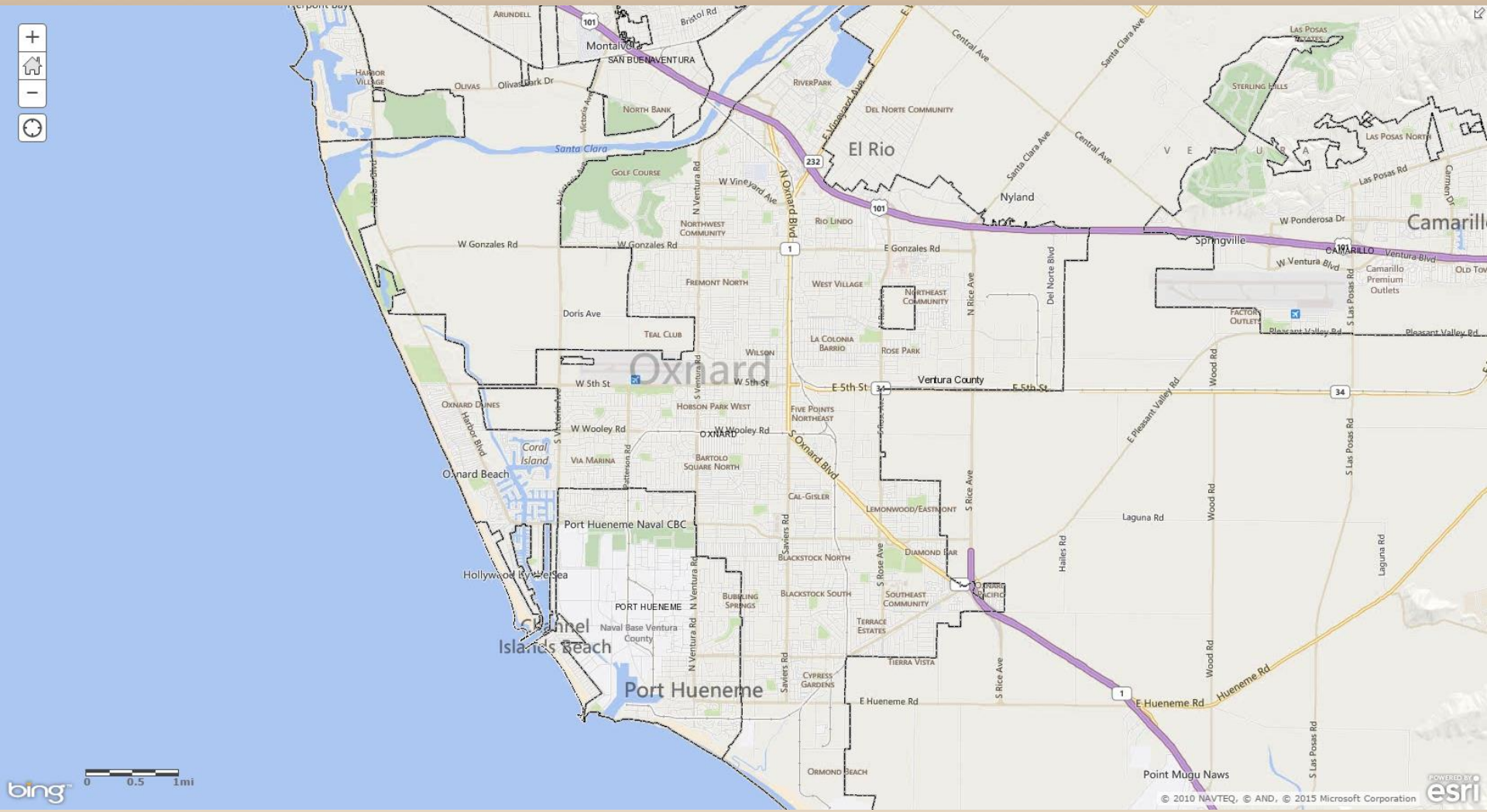

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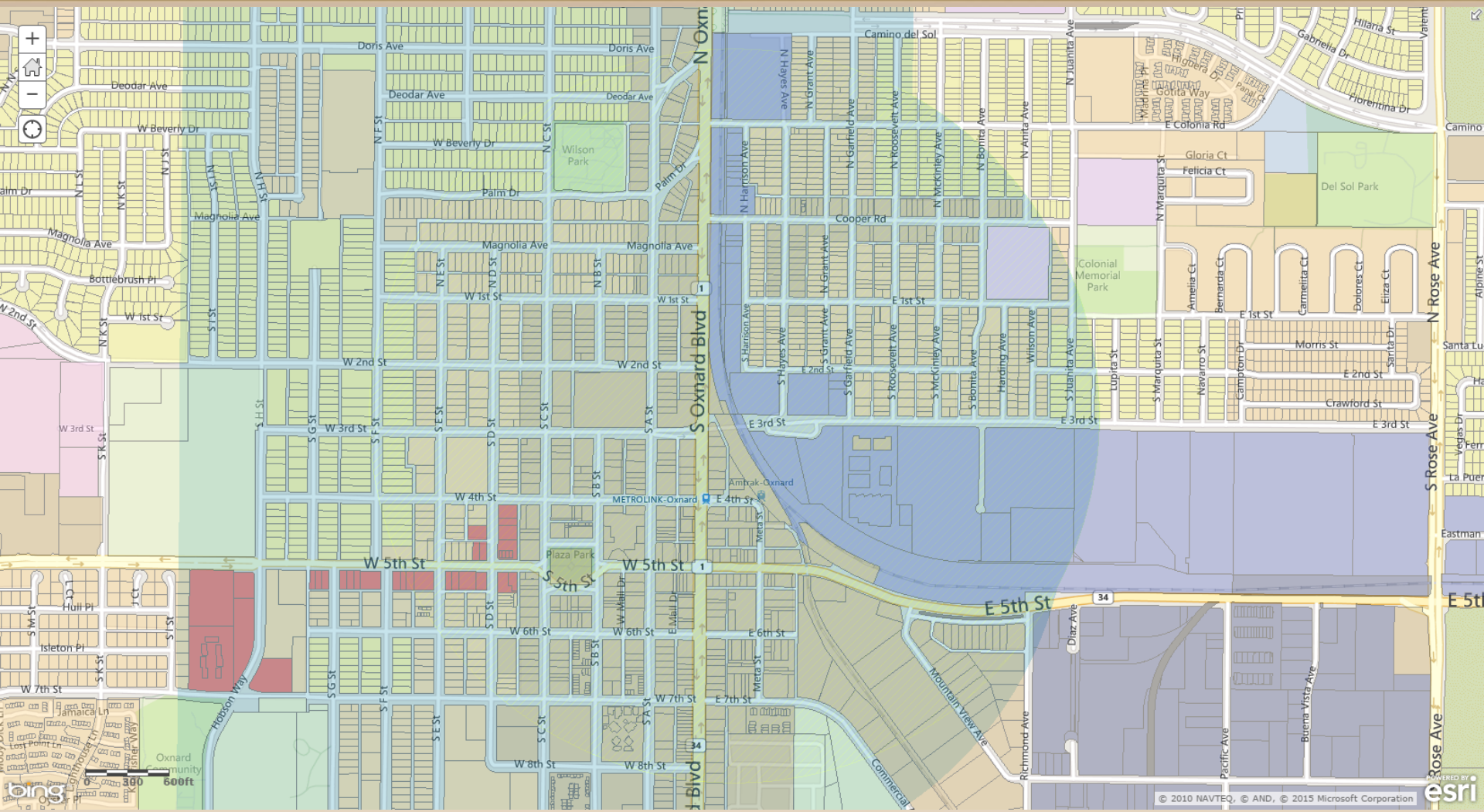

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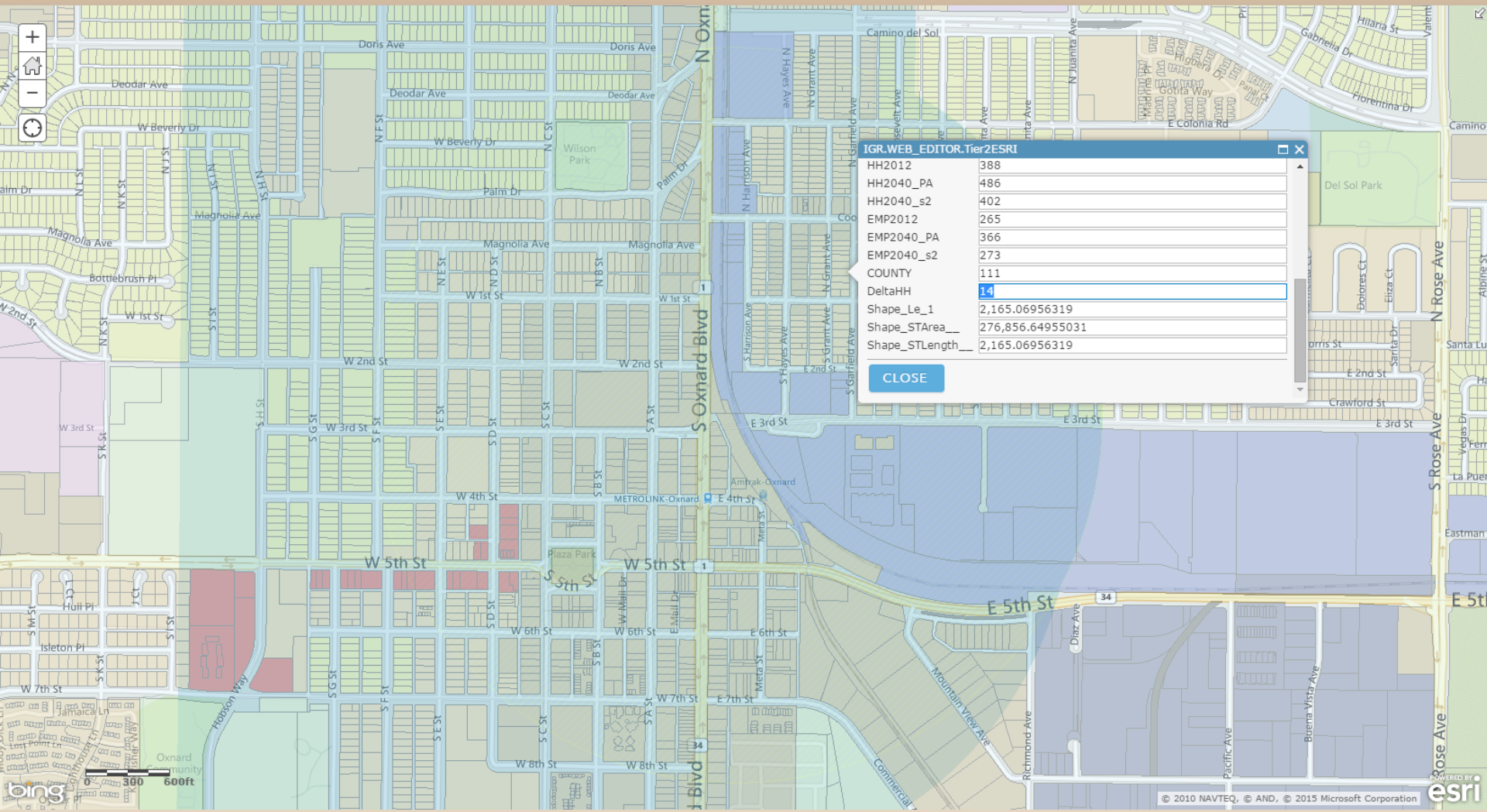


2016: Development Tools Used

- Esri
  - ArcGIS Online
    - Web AppBuilder
      - Custom Widgets
    - REST API
      - Map Services (reference layers)
      - Feature Services (editable layers)
      - Geoprocessing Services (user updates)
  - ArcGIS Desktop
- Microsoft
  - Excel
  - Visual Basic for Applications

2016 Interface (Excel)

Local Population Projection Tool (VMT Edition) **Beta Version**

Last Revised: May 24, 2016 at 2.40pm

Select a City from ONE of the following county drop-down menus:

Imperial County:	Los Angeles County:	Orange County:	Riverside County:
			Palm Springs

San Bernardino County:	Ventura County:

Jurisdiction Selection

Calibrate <--- Click here after selecting a city.

2016 Interface (Excel)

Preset Demand Scenarios

Moderate

Low: The household growth for the next 3 decades will each be 50% that of 2000 - 2010.

Moderate: The household growth for the next 3 decades will each be 100% that of 2000 - 2010.

High: The household growth for the next 3 decades will each be 150% that of 2000 - 2010.

Households Added in Selected Scenario: **Moderate (6693 households)**

OR

Custom Scenario *(this will ignore the value from the Preset Demand Scenario)*

Create a custom scenario by editing SCAG's household growth forecast at the TAZ geography on the SCAG web mapping system to calculate the 2010 - 2040 change in households.

Open TAZ Web Map

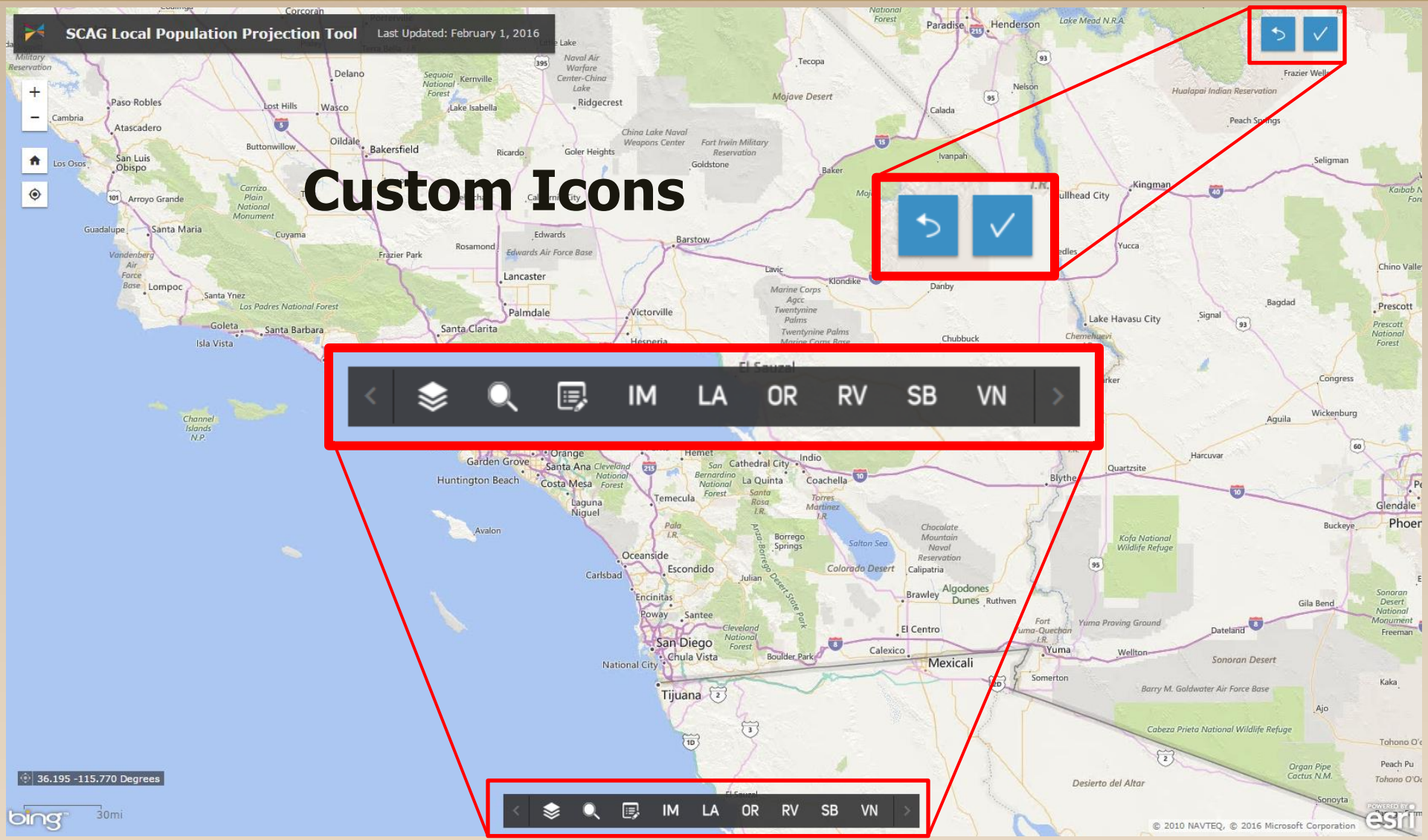
Then, enter the expected household change between 2010 and 2040 in the box below:

Run

After clicking 'Run', open the "Outputs" sheet to see the results.

Projection Method

2016 Interface (ArcGIS Online)



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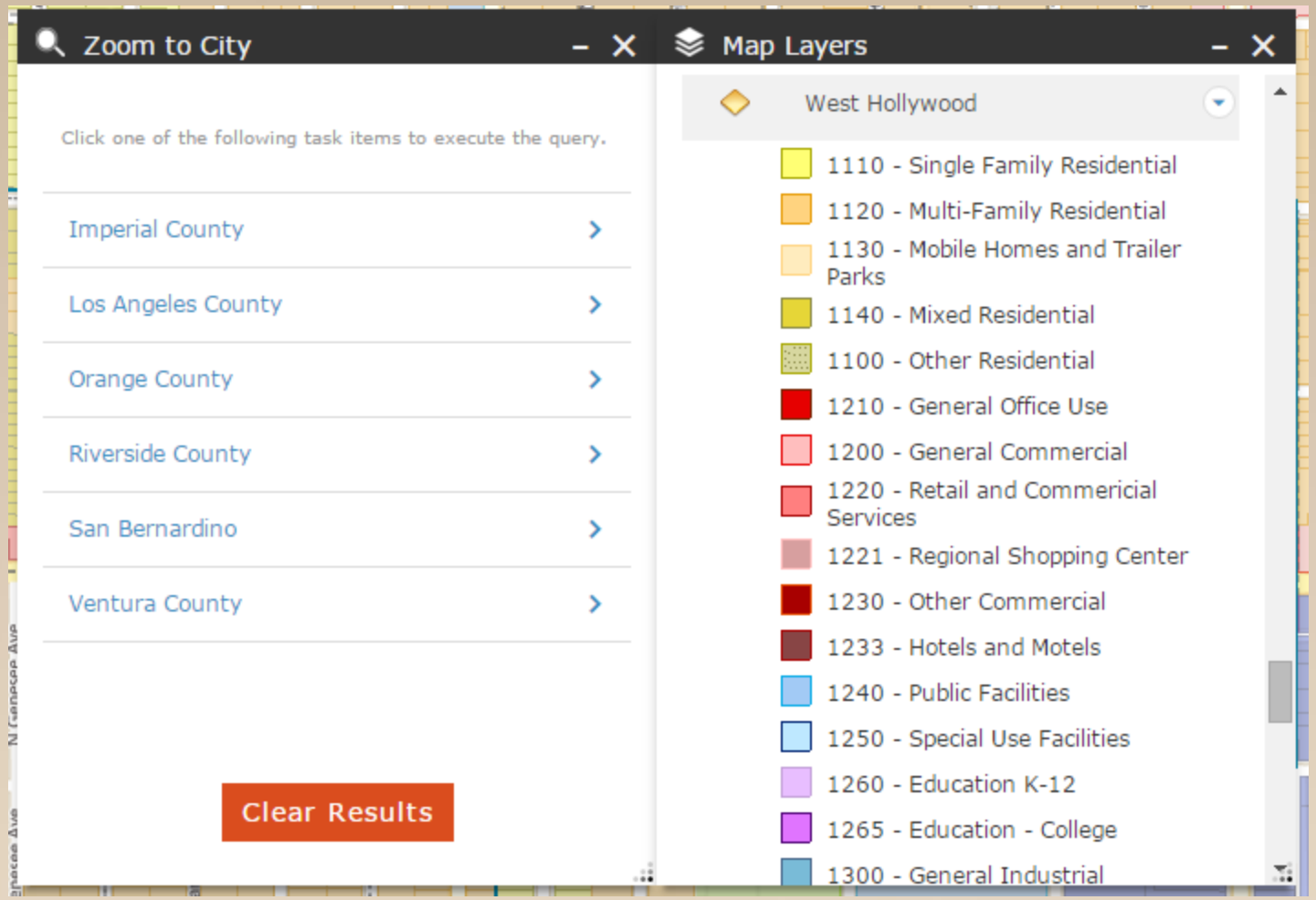

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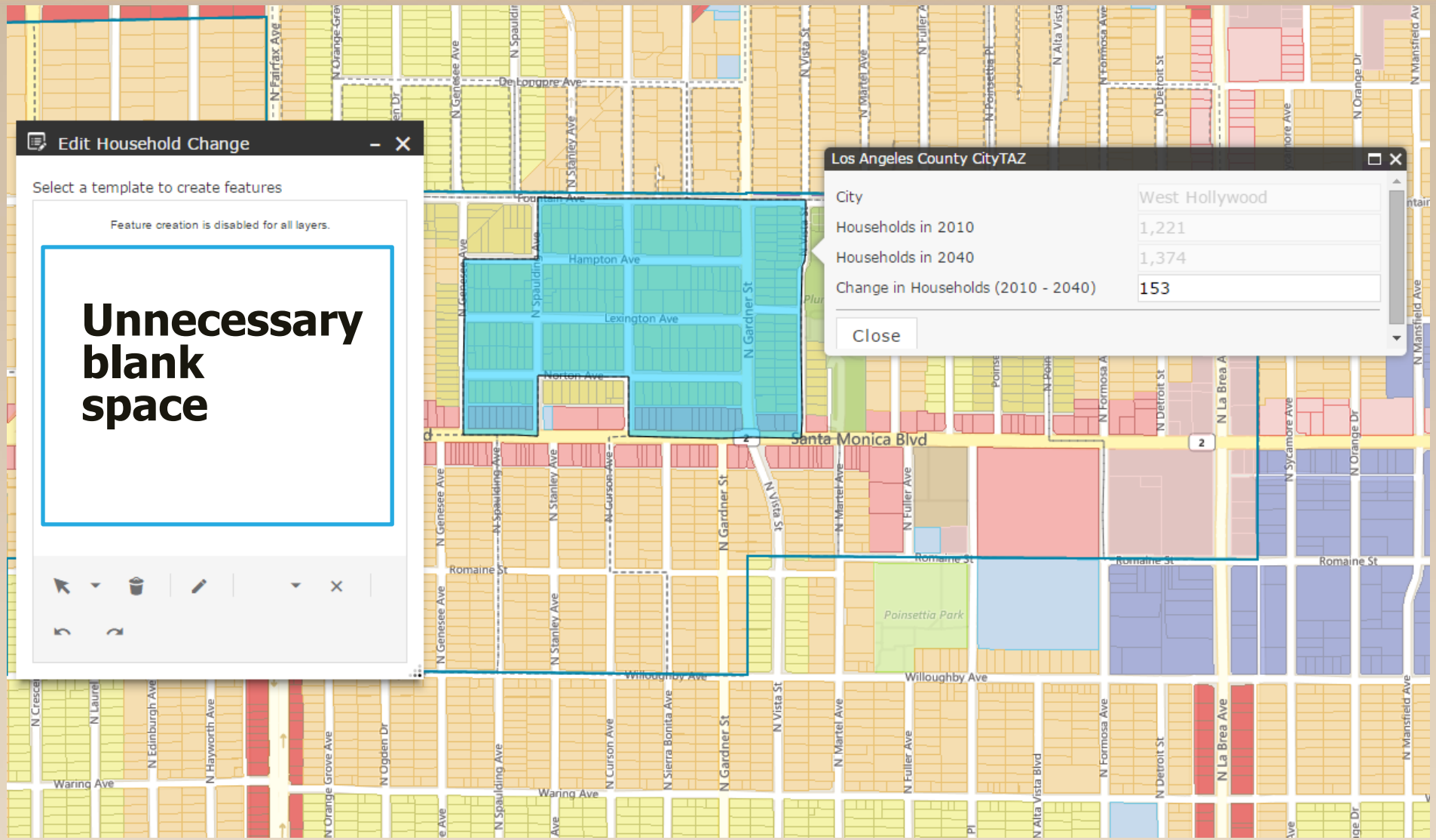

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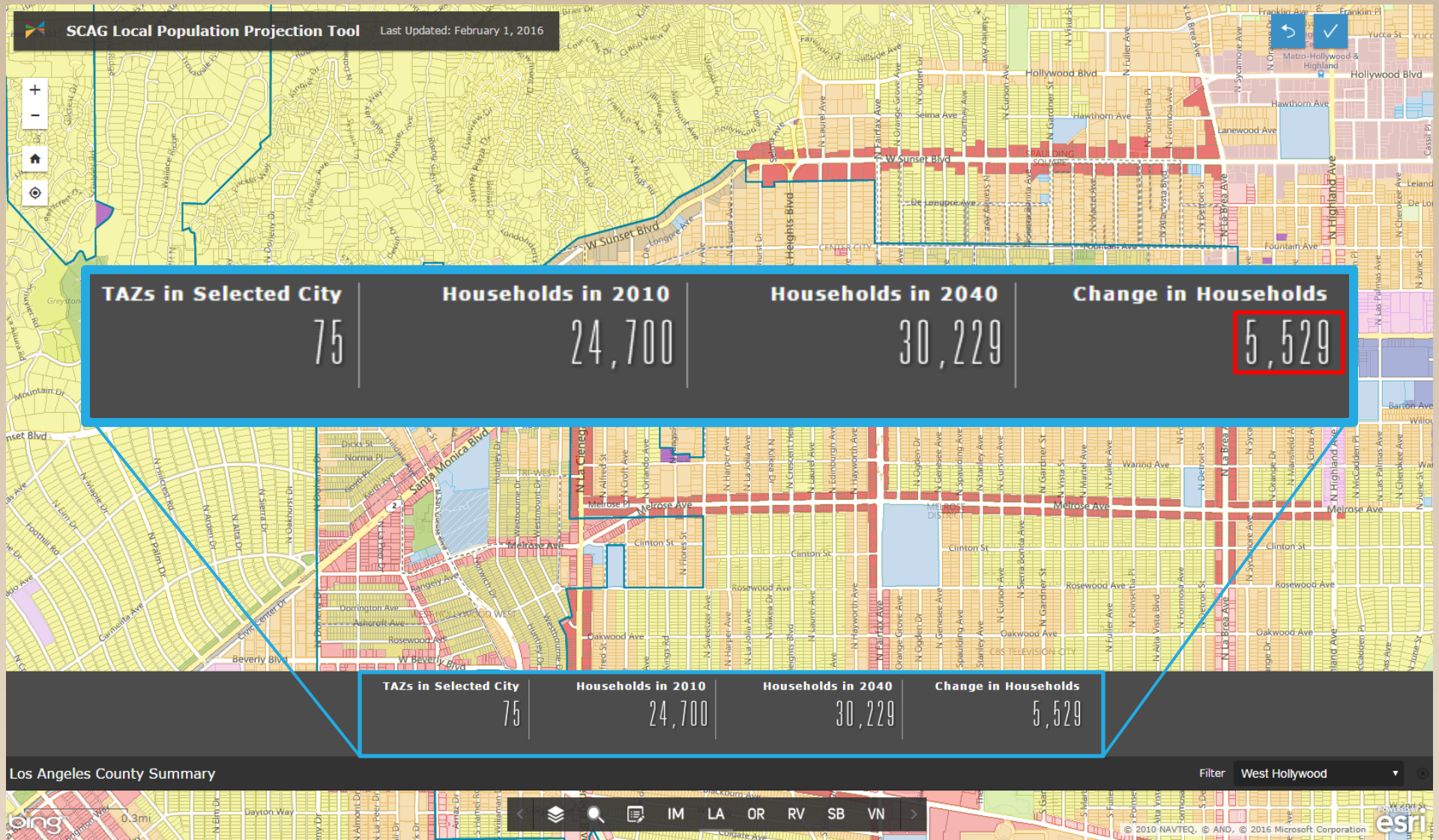

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5,529

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Projection Method

ArcGIS Web App Issues

- Processing Times
  - Layers can be slow/occasionally not load at all
    - Addressed by splitting up TAZ and land use feature servers by county
- Filter widget is inflexible
  - Unable to populate a filter list with cities based on a county selection
  - Instead, a list of all cities and all counties is shown
    - Addressed by creating 6 filters – one for each county TAZ layer
- Inconsistent Developer & Back-End Controls
  - e.g. Disabling geometry updates within Web AppBuilder does nothing if the back-end allows it

ArcGIS Web App Issues

- Versioning
  - No way to temporarily update features without also editing original values within geodatabase
    - Addressed by creating duplicate fields:
      - e.g. Original 2040 Households (locked)
      - e.g. New 2040 Households (editable)
      - To reset values, GP server is used to copy original field into edited field
        - » Problematic if multiple users are updating cities within the same county simultaneously
        - » Need to consider login credentials – Is it efficient to create 197 separate ArcGIS Online accounts?

ArcGIS Web App Issues

- Summary Failures
  - After the third or fourth summary within a session, the summary table stops loading
  - User has to refresh the window to view new city summaries

Future Improvements

- Parcel-level household growth editing
- Preventing user conflict
  - Possibilities:
    - Allocate jurisdictions an access time
    - Login credentials to restrict versioning
- Custom-area growth summaries
  - Planners and developers may be concerned with population growth within a specific area rather than within a whole city
    - e.g. Within a development that crosses the borders of two cities
    - e.g. Within a planning district that intersects only a few TAZs

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